

AMERICAN VETERINARY REVIEW.

A. LIAUTARD, M.D., V.S., EDITOR,

ASSISTED BY

A. LARGE, M.D., M.R.C.V.S.L., J. L. ROBERTSON, M.D., V.S., AND
A. A. HOLCOMBE, D.V.S.

PUBLISHED BY THE

UNITED STATES
VETERINARY MEDICAL ASSOCIATION.



AUGUST, 1878.

New York:

HOLT BROTHERS, STEAM BOOK AND JOB PRINTERS, 151 WILLIAM STREET.

1878.

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Hospital Gazette, New York; Medical Record, New York; Scientific American, New York; Scientific Farmer, Boston; Practical Farmer; Turf, Field and Farm; Rural New Yorker, New York; Country Gentleman, New York; National Live Stock Journal; Recueil de Medecine Veterinaire.

NEWSPAPERS.—Cincinnati Grange Bulletin; Maine Farmer; The Farm Journal, &c., &c.

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AMERICAN VETERINARY REVIEW,

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ORIGINAL ARTICLES.

A CONTRIBUTION

TO THE PATHOLOGY AND ÆTIOLOGY OF HUMAN AND ANIMAL
VARIOLÆ.

TRANSLATED BY F. S. BILLINGS.

(Continued from page 146.)

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The complications to which *v. vaccina* is liable are rather numerous. The normal development of the variolæ is very frequently interrupted by milking, by the animal itself in lying down, by licking the parts in question, by the contact of the complicated udder with the animal refuse on the stable floor, and by the latter itself; the variolæ are disturbed, suppurating ulcers become developed, hæmorrhages are frequently present; the development of eschars is retarded, and sometimes long continued profoundly irritating ulcerations are present upon the teats. Aside from this the grade of local inflammation upon the udder or teats, as well as the sensitiveness by milking, is chiefly conditioned by the number of pustules.

As to the *general phenomena anticipating and accompanying v. vaccinæ*, we find little constancy in the same; while in many cases the general condition of the animals remain undisturbed, and aside from the pain upon the udder, they do not seem to suffer any; by others the disease begins with a slight disturbance, salivation from the mouth, rumination with empty mouth, want of appetite, quantitative decrease of the milk, and light fever phenomena; occasionally we may observe marked feverish phenomena, and a violent painful reaction by touching the udder; the teats then offer a wounded and suppurative surface. With a thinner milk, we also observe a quantitative decrease of this secretion. The last finds a partial explanation at least, in the difficulty we meet with in stripping such cows on account of the pain united with the operation.

When we follow the progress of the disease in a herd, we observe that the same extends from one cow gradually over the other members of the herd, and that, as a rule, but few individuals remain immune from the disease processes. The extension takes place as by fixed contagii, in part through interposition of the straw, or flooring of the stable; in the greater number of cases, however, through the hands of the milkers. As a rule milk cows alone become diseased, not the young animals and bulls which may be in an infested stable. The fixed nature of the contagion is sufficient to explain the slow extension of the disease over the members of a given herd; the disease in large herds frequently continues for six months or over.

It will be our task yet to consider the category in which to place the dangerous exanthema which prevailed by cattle in the last century, which extended over the whole body, and was looked upon as a form of variolæ—Ramazzini. In reality it appears as if a general form of variolæ does occasionally appear by cattle. This very seldom form of variolæ vaccinæ was observed by Kullrich in the spring of 1862, by calves in Upper Schlesia; the animals present catarrhalic phenomena, nodes were diagnostically in the cutis, especially upon the median surface of the extremities, the genitals and udder; variolæ were apparent on the scrotum of a young bull. The nodes were hyperamic, varying in

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size from that of a pea to a ten cent piece, more or less thickly together upon the places in question, isolated upon other parts of the cutis; upon the neck of the animals circumscribed eczemata were observable. The nodes transformed in a few days to brownish eschars, which left behind them deep cicatrices. The ætiological momenta remains unknown. The lymph from two undeveloped nodes was collected and sent to the inoculation station in Berlin. Inoculatory experiments with the same on several cattle gave negative results. By only one of the cattle in question there developed in course of time an isolated variola, which, on being reinoculated through several generations, lead to the development of normal variolæ. Variolæ have been noticed upon the nose of a sucking calf, the mother of which was diseased with vaccina.

As already mentioned, the diagnosis of variolæ vaccinae is sometimes accompanied by certain difficulties, a circumstance which is grounded in the unfrequency of the processes, as well as in their sporadic appearance. I will not here enter into an intimate discussion of the so-called variola vaccina spuria, the accumulated, indurated, and varicella-like variolæ—which are often mistaken for the true eruption. We also find variolæ-like exanthemata upon the udder of the cow by some infectious disease. By apthæ epizooticæ are frequently met with variolæ-like noduli and nodi, which are gradually transformed into pustulæ and large confluent bullæ. The contents is fluid, and generally of an intense yellow color. According to Reiter, inoculation with the same gave negative results, while in other cases positive results are said to have been attained.

By the nasal-diphtheria of cattle we also find a herpes-like exanthema upon the udder, which can however, scarcely be complicated with variola.

As a severe form of variolæ which extended over the entire body of the diseased cattle, and which was directly compared with *v. humana*, a disease was described in the last century, which appeared in Lombardy, in Holland, Holstein, and in a very malignant form in England (Layard), and occasioned great devastation. A similar malignant form of variolæ is said to have prevailed in East India in the fourth decennium of the present cen-

ture.—(Kussmaul Bohn.) Authors have previously considered this disease to be a true variola; or, also apthæ epizooticæ.—Hering. I do not for a moment doubt that this nominal variolæ was anything other than rinderpest, especially as several distinguished investigators of the present day—Murchison and Sanderson—have from their own studies of this disease been led to the conclusion that the rinderpest stands in very close (characteristic 13?) relationship with variola humana vera. (See 3d Report of Eng. Commissioners on Cattle Plague, 1866.) For the differential diagnosis of variola vaccina vera, the accidental transmission to man frequently offers a very safe indicator, and this property is essentially valuable, because the diagnosis is frequently rendered difficult by the already mentioned typical course of *v. vaccina*, the same having been frequently enough taken for varicella-like, or emphyzematous variolæ. When milkers have insignificant injuries upon their fingers, they offer very favorable subjects for accidental inoculation; the seat of the variola is generally the end joint of the finger, the hands, the arms, much less frequently upon other parts, as the feet, the nasal extremity.

Before we turn ourselves to the consideration of the genesis of *v. vaccina* it seems appropriate for us to briefly consider the local and periodical appearance of variolæ, as well as the relations of the dispositional sexual relations of cattle to *v. vaccina*. The infrequency with which *v. vaccina* comes to observation may be drawn from our previous remarks. According to Hering, in Wuerttemberg, in the course of ten years—1827–1837—eighty-four cases of *v. vaccina vera* were recorded—with successful transmission to man,—and beside that 208 cases which were probably the true disease, by which the transmission to man in part proved negative, and in part was not attempted; an average of thirty cases per year. In 1873 there were indicated in Wuerttemberg 39 cases, in 1874, 28 cases of *v. vaccina*. There is no reason to doubt that the disease is as frequent an occurrence in other parts. The only way to acquire an accurate statistical knowledge of such diseases is to call the attention, and make it the duty of every veterinarian and breeder to report such cases, and to excite the latter to more earnestness in such matters by

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With regard to the period (season) in which the eruption most frequently takes place, the observation of Jenner's that variolæ vaccina comes to pass most frequently in spring and early summer, has been completely confirmed by Reiters and Hering; although no season of the year is entirely free from the same. Authors have sought to explain this in many ways, for instance: by assuming a certain inclination to prevail at such times to critical eruptions; that at this time the change from dry to green food takes place, and that the cause or a collateral cause to the eruption of variola must be sought in the increased flow of fluids to the udder, as well as in the increased lactation.

That an individual or better sexual disposition took part in the pathogenesis of the disease, was concluded, from the fact, that the disease is almost exclusively limited to cows, and, indeed, especially during the period of lactation, that $\frac{2}{3}$ of the complicated cows were found to be in the primary stages of milking, while the other $\frac{1}{3}$ were old milkers. When the disease is found by non-milking heifers, a very seldom occurrence, we are in general able to prove, that a short time previously other animals—milk-cows—had been diseased with variola in the stable in question; that the disease can only take place by infection. The case is the same when variolæ are observed by young animals, and by bulls (upon the scrotum) when the disease is prevailing in a large stable; in both cases it is not the hand of the milkers, but in all probability the straw has been the intermediary or vehicle of the contagium.

What is then the genesis of variola vaccina?

When I again reopen this frequently ventilated and as frequently unanswered question, it is with the hope of presenting some new points to the consideration of observers, which have to this time received but little attention, and which are yet of importance in investigating for the origin of the bovine variola.

When a so manifestly contagious disease as variola vaccina appears so seldom, and then only in a sporadic form, and as suddenly disappears, it is certainly natural that we should desire to

same. Aside from the circumstance that sheep can be successfully inoculated with vaccine, and that the ovine organism possesses the peculiarity, that it frequently generalises the vaccine, there is no nearer relationship between *v. ovina* and *v. vaccina*. The vaccinated disease of sheep is not identical with variola ovina; were it so, there must necessarily take place accidental transmissions of *v. ovina* to cattle of every sex and age, which is in fact not the case.

The only remaining forms of variola, in which we may seek the genesis of the bovine variety, are variola humana vera and the artificial (variolated) protective variola of man; so that I feel myself justified in formulating the following axiom, to which we have arrived per exclusion.

The origin of the so-called "original" or true bovine variola, variola vaccina—can only lie in the human vaccina or variola.

That variola humana vera inoculated upon cows is able to generate variola vaccina, is proven by the experiments of Gassner, Sunderland, Theile, Ceely, Badcock, and others, to which I must more intimately refer on account of their fundamental importance.

According to the data given by Bohn, ("Handbuch der vaccination," Leipzig, 1875), the first experiment of this kind was made by Gassner, in 1807, in Guenzburg, who inoculated several cows with variola from children, and received positive results, that is, by eleven cows, variola vaccina developed, and from the last he vaccinated four children, and received very fine inoculatory pustulæ.

The greatest credit in this question belongs undoubtedly to Thiele in Karan, 1836, and the Englishman Ceely, 1838. They inoculated cows with the lymph from human variola upon the udder and vulva, and received thereby true variola vaccina, localized upon the place of inoculation. In no case did there develop a general exanthema by the inoculated cows.

The so generated artificial variola vaccine, or better-vaccinated variola, deports itself by further inoculation in exactly the same manner as the so-called original cow or vaccine lymph. The pustule has the greatest virulence from the sixth to tenth day, and ex-

erts the same action when inoculated upon children as the common vaccine, only that the development of the inoculatory pustules is more intensive in the first generations. Thiele was able to pass his new inoculative material through seventy-five human generations, and to transmit the same to more than three thousand persons. The protective power of this variola vaccine was confirmed by testing inoculations with the true contagium of variola in twenty-one cases. Ceely obtained like results with variola vaccine, he and other English doctors proving it through more than sixty generations, by which it still retained its general characteristics; the protective power of the same was tested by numerous inoculations with variola-pus. Variola vaccine, therefore, corresponds with the genuine cow lymph; inoculation with it protects man from attacks of human variola.

Badeock received positive results from inoculating a cow on the udder with variola; from eight cows vaccinated with variola he received positive results by three, and from the latter he made numerous inoculations, and proved this vaccine also to be a prophylacticum against human variola. Six further inoculations of cows with variola lymph proved negative, from which we see with what difficulty the contagium of human variola infects cattle, and vice versa. Senfft has lately received positive results from his experimental inoculations of calves with variola-pus; he received local vaccine pustules without any indications of general disturbance or general exanthema. The further inoculations of a calf gave positive results; the animals were found non-susceptible to further vaccination.

From these experiments we see that it is possible to develop *variola vaccina* from *variola humana vera*, and that our above mentioned conclusion, *that the bovine variola descends from the true variola of man, is based upon facts*. The bovine organismus has the ability at the same time to reduce the contagious element of variola humana, and to transform the same to a benevolent vaccine contagium. This faculty is exactly opposed to that of sheep, by which we have seen that under certain circumstances, the contagium of vaccine became generalized, and assumed a malignant form. In this case it appears as if the variola vaccine in

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passing through the ovine organism again assumed its original properties—that is those of the contagium of *v. humana vera*.

We are not without reports of negative results, which stand opposed to those we have just considered. Reiter received only negative results from his variola inoculations upon cattle. A commission in Lyons, composed of Chauveau, Viennois and Meynef, 1865, basing themselves upon the results of their experiments, that the organism of cattle is incapable of transforming the variola of man into vaccine, but that the same produces again only bovine variola, which presents itself as a simple pustulous eruption. A similar result was obtained by a Turin commission 1871-'74, viz: Human variola is not to be transmitted to cattle.

As by all such questions, negative results cannot do away with a large succession of positive experiments, and it is undoubtedly necessary that many circumstances must happily unite in order to produce positive results. As Bohn says, it is as essentially dependant upon the manner of inoculation as upon the animals selected. How else shall we explain the positive results obtained by Senfft with his calves? An analogy to the same is in a certain way offered by the retro-vaccination of man. While many observers assert that they have met with great assistance on the part of the human organism against retro-vaccination, other experienced experimenters, as Reiter, Kranz and others, have almost always received positive results.

We can happily strengthen our conclusions, and the above noticed positive results which go to prove the causal-nexus between *v. humana* and *v. vaccina*, by carefully observed and recorded proofs of the accidental (not experimental) transmission of the human form of variola to the bovine organism.

Ceely, the exact and trustworthy English observer relates in his book with almost painful exactness the following case: In the vale of Aylesbury the cows of a stable had opportunity to smell and lick the bedding of a person who had died of variola, which was spread out to air on the grass of a meadow. The cows grazed in this place and in the course of twelve or fourteen days, variola vaccina broke out by five of them, almost at the same time, and this was accidentally transmitted to them, the owner and milker

of the cows, and from the last, children were successfully inoculated through several generations. At the same time variola vaccine did not prevail among the remaining cattle of the valley. That no complication was in this case made with the exanthema of aphthæ epizooticæ is proven by the fact that the cows were subsequently attacked by the latter disease. Other very interesting and thoroughly confirmed cases of positive infection are reported by Ceely in his very interesting work, "Observation over Cow Pock," (variola vaccina) and Vaccination, etc." Dinter made similar observations in Saxony in 1860; and in the Prussian Veterinary Report, 1855-'65, the same phenomena are mentioned, viz: the coeval appearance of humana and bovine variola. In Holstein, epizootics of vaccina and variola epidemics have been repeatedly observed.

We observe, therefore, that human variola may be transformed into vaccina through both artificial and accidental transmission, and have in this way secured a safe indicator in our search for the origin of variola vaccina. V. vaccina generated in this manner distinguishes itself in no way from the so-called pure or original bovine variola, and deports itself in exactly the same manner as well with regard to further inoculations of cattle and man, as with regard to the activity of the inoculating lymph, and its protective power. As, however, variola vaccine comes to pass in all directions, although in a sporadic form, either by individuals, or enzootic, limited to stables or herds, it must be evident that it is impossible, that it should in all cases owe its (direct) genesis to human variola. The latter coincides with v. vaccina only in exceptional cases, and generally fails far and near in regions and times when v. vaccina breaks out, a point Bohn especially emphasises.

We must yet seek for still other springs from which this bovine malady takes its origin, as we cannot on any account concede to it an abiogenetic origin. Although individual authors have asserted that the fact, that this bovine malady comes to pass in places where neither humana or equine variola were to be found, speaks strongly for its epigenetic origin, yet they entirely overlook the fact that *vaccination is practiced on all sides*. As

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we have been unable to consider the remaining animal forms of variola as the genetic points of v. vaccina, there remains to us yet the humanized vaccine as the most dispensed—extended—of all the forms of variolic contagium, which is introduced by the inoculating doctor, in an artificial manner, in almost every house in the land, (Germany). *We have to seek in humanized vaccine the spring from which the greater number of cases of bovine variola take their origin.*

In order to prove this assertion, I must briefly consider the subject of *Retro-vaccination*, in which I follow the previously alluded to work of Bohn.

Sacco was the first to employ retro-vaccination, that is, the inoculation of humanized vaccine upon cattle, for the purpose of having on hand a supply of fresh lymph. The subject attained a great extension, in the twentieth and thirtieth decenniums of this century, in order to freshen and reinvigorate the lymph, which had become weakened by passing through more or less human generations, by introducing it into its original place of development, the bovine organismus.

(To be continued.)

ANATOMY OF REGIONS.

Translated from Peuch and Toussaint, Precis de Chirurgie Veterinaire, by A. Liautard, M.D., V.S.

CONTINUED FROM PAGE 151.

ORBITAL REGION AND OCULAR APPARATUS.

Situated on the boundaries of the anterior and lateral faces of the head, the orbital region presents to study superficial parts and deep organs. The former or protecting parts of the eye are the eyebrows, the eye lids and the membrana nictitans. The

deep organs are the globe of the eye, the lacrymal apparatus, the muscles moving the globe, blood vessels and nerves; all enclosed in the ocular sheath, a kind of envelope which isolates them from the surrounding parts.

SUPRACILIARY REGION.

It has for base, inwardly, the orbital process of the frontal, outwardly the apex of the zygomatic process of the temporal and the superior extremity of the malar bone resting on the temporal. It is limited above by the hollows of the eye* below by the superior eyelid, inside by the frontal region, outside it extends to the masseterine region. It is therefore elongated sideways, slightly convex from above below, and curved in its great axis.

The skin of that region is somewhat thick, and is covered with hairs, early in foetal life; these are uniform and short, mixed up with some long and strong ones. Under the skin we find 1° the superior fibres of the orbicularis palpebrum, very adhering to the skin and under, immediately on the bone, a connective tissue somewhat abundant and easily infiltrated.

We find also the orbital process of the frontal turned outward, downward and a little backward, about one centimeter thick behind, sharp forward, and perforated at the base by the ciliary foramen, which gives passage to the nerve and artery of the same name; it rests upon the extremity of the temporal. The orbital process covers the lacrymal gland and the globe of the eye. The blood vessels are small; they come from the ophthalmic artery, and go to the angular vein. Sensitive nerves come from the fifth pair.

Differences—That region in carnivorous and in pigs has, properly speaking, no bony frame; the orbital process of the frontal not resting on the zygomatic process. In its place is found a fibrous cord on which the ocular sheath is attached.

PALPEBRAL REGION.

The eyelids are membranous sheaths placed in front of the ocular globe, which they partly or entirely cover, whether open or closed. It is not easy to define closely the eyelids, as they

*Salicere.

are continued with the orbital frein. We find the sharp superior, on the commissure or nasal angle, differ from the free, thin, stiff hairs, found on the internal thin long.

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The anterior to the free border and one half higher than the brow by a distance below which three fissures face, while the transverse fissure

Above the irregularly triangular continuation of the face as a concave surface which the internal face of the convexity of the conjunctiva which inferior ocular

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are continued without well marked separation, the superior with the orbital region, the inferior with the cheek and chanfrein. We may, however, say that their approximate boundaries is the sharp edge of the orbite. They are two in number, one superior, one inferior, united at their extremities to form the commissures or angles of the eye, one internal obtus the great or nasal angle; one external small or temporal angle. They differ from each other in their external forms. The superior is convex from side to side, and from above below; it has a free, thin, sharp border, upon which are found implanted long, stiff hairs, turned outward and downward. These eye lashes are found on the middle of the free border; they are missing in the internal third and the external fifth. In the middle they are quite long.

When the eye is open the free border of the eyelid describes a curve in its two external thirds, and a straight line in the internal third—a more marked curve unite these on a line with the internal and two external thirds.

The anterior surface offers two well marked fissures, parallel to the free border; one is about one millimeter to one millimeter and one half from the border, the other about three millimeters higher than the other. The eyelid is separated from the eye brow by a deep fissure running along the superior orbital arch, below which it is situated. When the eyelids are closed the three fissures disappear, and then one has a convex, uniform surface, while the curves of the free border disappear and form a transverse fissure almost straight.

Above the internal third of the eyelid one finds a flat surface, irregularly triangular in form, which sometimes presents the continuation of the external part, but which offers oftener a flat surface as a consequence of the contraction of the muscular fasciculus which stretches the skin of that part of the region. The internal face is smooth and concave, to adapt itself exactly to the convexity of the globe of the eye. It is lined by the conjunctiva which, folding back over the eye, forms the superior and inferior oculo-palpebral fissure.

The inferior eye lid is better limited; regularly convex an

more prominent; its free border is almost concave; its most internal part only is straight and goes to meet the extremity of the superior border to form the obtuse angle of the eye. The eye lashes of the lower lid are few and shorter than those of the superior one.

In the thickness of the skin, besides long and stiff hairs are found tentacles analogous to those of the lips and chin.

The external or temporal angle, or external commissure, unites by a short curve the free borders of the eyelids. Outside, the inferior lid seems to be covered by the superior, and thus the angle seems more acute than it really is; a fissure running outward separates the two lids quite plainly.

The internal or nasal angle, or internal commissure is rounded and lodges a peculiar organ, black in color, or marbled with white, of the size and convexity of a pea; this is the caruncula lacrymalis. On a deeper plan one sees also the extremity of the free border of the membrana nictitans or third eyelid.

The straight fissure which indicates the limit of the closed eyelids extends about one centimeter beyond the nasal angle of the eye, by a fold of skin detected only when the eye is closed.

Going from superficial to deep parts, the eyelids are made of: 1°—the external skin; 2°—a sphincter muscle; 3°—a fibrous frame, carrying on its free border; 4°—a cartilage containing peculiar glands; 5°—a layer of loose and abundant connective tissue; 6°—the tendinous expansion of the elevator of the upper lid proper; 7°—the internal tegument or conjunctiva; 8°—blood vessels and nerves.

1°. The skin of the eyelid is very thin, and covered with very short and fine hairs. Long, stiff hairs, analogous to those of the lips and chin, are found on them, and specially on the inferior one. Near the free border, principally on the inferior and internal third of the upper lid and in the commissures, the hairs are absent and the eyelid assumes a shying dark tint in animals whose skin is pigmented. The skin is very adherent to the sphincter, and much care is required to isolate it, so thin is the layer of connective tissue underneath—it seems even to be absent

and shows the eyelids.

2°. The fibrous frame of the bones of the eye, we may call it a tubercle at the free border of the commissure of the periciliary membrane, outwards the fibres of the membrane uncovers the

3°. Under the cellular tissue

This layer, prior, is attached and is continuous with the free border of the commissure. Winslow has deserved to

4°. The tarsal sending elongated prior tarsus is while the folds of the tilages is the border of the These are serous humour quantity in the conjunctiva and

5°. The tissue which is proper of the external blood

and shows itself slightly only in cases of general infiltration of the eyelids.

2°. The orbicularis palpebrum is very thin. It lays on the fibrous frame. Its fibres overlap the lids and are attached upon the bones forming the orbits. As point of origin of their fibres, we may consider a small tendon extending from the lacrymal tubercle at the nasal angle of the eye, and from this point the fibres surround the eyelids in assuming a direction parallel to the free border. They are continued in each one at the external commissure of the eye. A small muscular fasciculus, the fronto superciliary muscle, attached on the frontal bone, runs obliquely outwards and downwards to implant itself upon the superior fibres of the sphincter, near the nasal angle. In contracting, it uncovers this angle and increases the concavity of the upper lid.

3°. Under the orbicularis is found a layer of quite loose cellular tissue, separating it from the fibrous frame.

This last, more marked on the superior lid than on the inferior, is attached by its adherent border to the edges of the orbit, and is continual with the periosteum and the ocular sheath. Its free border supports the tarsus (cartilage) on a level with the commissures. The fibrous layer becomes so thick and strong that Winslow has named it the ligament of the tarsi, a name which it deserves to some extent.

4°. The tarsi form to the lids a cartilaginous frame representing elongated pieces about nine millimeters wide. The superior tarsus is stronger than the inferior, which is almost straight, while the former is much convex. The internal face of the cartilages is hollowed with small grooves, perpendicular to the free border of the lids, in which the glands of Meibomius are received. These are small glands in groupes, which secrete a peculiar onctuous humour, always rare in ordinary circumstance, but whose quantity increases considerably in inflamed conditions of the conjunctiva and in serious morbid states, as in enteritis, for instance.

5°. We had made a special layer of the loose connective tissue which unites the fibrous layer of the tendons of the elevator proper of the inferior lid; as in cases of serous infiltration, after external blows, this tissue assumes a great importance. Scarcely

noticeable in healthy conditions, it becomes, in some cases, and in a few hours, the seat of considerable serous effusion, for both lids, at such a degree that, not only the animal cannot raise them, but even the fingers of the observer failed to separate them. It is, then, in the layer of this connective tissue, that this infiltration exists, the sphincter muscle being included in it also. Often this layer is thicker, double, even treble of its normal size, and the infiltration extends to the superciliary region. The same takes place for the sub cutaneous layer, but it is immediately on the conjunctiva that the infiltration takes place, which is easily detected by the color of the mucous membrane.

6°. Under the fibrous layer, the cartilages and the connective tissue, we find at the upper lid only the tendons of the elevator proper. This is nothing but a thin aponeurosis extending in the whole width of the lid, and attached to the adherent border of the tarsus cartilage.

7°. And when all these layers are removed, we have exposed the portions of the ocular mucous called palpebral conjunctiva, of which we will speak hereafter.

8°. *Blood vessels and nerves.* The arteries going to the lids are numerous but small. The ophthalmic artery furnishes the superciliary which runs through the supra orbital foramen and ramifies specially in the upper lid, and the lacrymal artery carrying the blood to the gland of the same name, its ramifications going to the upper lid also. The orbital branch of the superior dental artery gives divisions to the inferior lid, lacrymal apparatus, and membrana nictitans. The inferior lid receives also divisions of the superior terminal branch of the glosso facial.

Veins go to the angular of the eye, superior origin of the glosso-facial, and to the alveolar as it passes in the ocular sheath.

Nerves rise from two sources, the sensitive branches from the ophthalmic branch of the fifth pair; the motor branches from the seventh pair through the intermedium of the anterior auricular nerve.

The paralysis of the fifth pair removes the sensibility and the voluntary motions of the lids, but the reflex motions called wink-

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[*To be Continued.*]

EDITORIAL.

UNITED STATES VETERINARY MEDICAL ASSOCIATION.

In a few weeks the anniversary and annual meeting of the United States Veterinary Medical Association will take place at its ordinary place of meeting, the American Veterinary College, in New York city.

This is an occasion always looked for by the numerous members of the Association, and though the gentlemen who belong to it are pretty well scattered all over the country, they always manage to be present, and to arrange their business so as to come and meet some friends and colleagues; others, friends, colleagues and alumni of the same school.

As the number of members has been yearly increasing, especially for the past few years, the next meeting will in all probability prove one of the largest gatherings of veterinarians on this continent, even larger than the one which took place two years ago in Philadelphia, on the occasion of the centennial festivals.

It is to be hoped, however, that the transactions which will take place at that meeting will be sufficiently interesting to repay for their trouble those who have to come a long journey to attend it, and that the officers of the Association have succeeded in obtaining from members interesting papers to be read and discussed on that occasion.

By a resolution passed some time ago, two prizes are offered for the best papers on subjects pertaining to veterinary medicine. This ought to be well-known by the members, and ought to be a stimulus for many of them. The Association counts a number of young men recently graduated, and they ought not to remain satisfied with their graduation and take a back seat, thus resting

on their laurels; no, they ought to be the most anxious candidates for these prizes, and though we hear that, so far, only one paper is to be presented, we hope others will be sent in to be read, discussed, and rewarded according to their merits at this next session.

But not only that, we have a number of committees whose reports will prove, no doubt, of much interest, and certainly, amongst them, the Committee on Diseases will have ample materials to keep the members together and sufficiently interested to forget the time of parting.

If, besides, we bear in mind that the occasion will be the second birthday of the **AMERICAN VETERINARY REVIEW**—born from the Association at one of its meetings—considering the success which has crowned this representant of our professional interest, we cannot help thinking that this meeting will prove to the American veterinarian a regular holiday, and that most of the members will feel it their duty to answer the roll call.

EXTRACTS FROM FOREIGN JOURNALS.

BY A. LIAUTARD, M.D., V.S.

HERNIA OF THE UTERUS IN A SLUT.

A mongrel slut, seven years old, had a litter of six or seven puppies in 1876, after what she exhibited a tumor at the posterior part of the left mammanæ, round, and of the size of a hen's egg. The following year she was covered, and shortly afterwards this tumor began to enlarge. Her abdomen had also increased; she was pregnant, and soon gave birth, through the natural passages, to a well-made dog, which lived only four days. As the tumor had increased, was more depressible and fluctuating, medical advice was asked. At first the whole trouble was supposed to be only a mammary tumor, but after another examination it was found that the tumor had ulcerated, and that through it a greyish puss was escaping. At the same time a small paw having protruded through the opening, the slut had torn it and pulled it off. Then the ulcer of the skin had the size of a pencil,

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its borders were inflamed, the hairs all round were covered with a sanious offensive discharge; a certain amount of discharge passed through the vulva. The abscess was freely open, and a dead foetus was removed perfectly intact. No trace of the foetus from which the paw had been torn could be found. At the examination postponed to the next day, a communication between the uterus and the external abscess was detected, and after forty-eight hours of treatment the slut died. Post-mortem revealed extensive peritonitis with effusion, hernia of the horns of the uterus through an opening situated on a level with the posterior part of the left mammae opening, which on account of the condition of the parts could not be well ascertained as the inguinal ring or not. The ureters are drawn down by the uterus and form a web with convexity turned downward before reaching the bladder. The horns of the uterus are gangrenous and putrified, a part of the body of the uterus is engaged in the cavity of the abscess, and seems to be the seat of a stricture quite well marked on a level with the superior plan of the abdominal wall. The internal surface of the uterus or vagina is inflamed and blackish. There is also a complete rupture of the uterus, involving three coats, and whose aspect shows it to be of recent date. The pouch containing the protruding organ has an aufractuous, granulating surface in which float pieces of surrounding tissues; frequently it presents adipose masses surrounding the uterus.—(*Archives Vet.*)

BRONCHOCELE IN A DOG.

The application of sub-cutaneous injections, as promoted by Dr. Luton, have given, in this case, excellent results.

A dog five months old had near the middle of neck a tumor of the size of a small apple, more prominent when the animal raised its head; it is bilobulated, painless, not warm, soft and non-fluctuating. Each lobe is ovoid in form, not adherent to surrounding tissues, and rolls easily under the skin. Each one is lodged near the larynx, on the side of the trachea, and inferiorly seem they united by a thin band.

An injection of tincture of iodine (one gramme) was made

upon each lobe, penetrating in the substance of the tumor—the next day quite large œdemæ, not very painful, which disappeared after four days.

Some three months after the tumor had somewhat diminished and is more indurated. Another injection only in the sub-cutaneous cellular tissue is made on a level with the thyroid bodies. Ædemæ larger than at first, more painful, which toward the sixth day has the character of an abscess. This, however, is gradually resorbed, and with this the tumor diminishes little by little and soon disappears.—(*Arch. Vet.*)

NEW TREATMENT OF TETANUS.

W. Durocq reports two cases of traumatic lockjaw, which he treated successfully with spirits of turpentine. After several unsatisfactory attempts he composed the following drench: Spirits turpentine, one litre; camphor, twenty grammes; eggs, eight.

In a first case, a filly of three years, affected for three days, was placed in a dark and quiet stall and received half of the above mixture, which was renewed the next day. In a second case a gelding of three years, sick eight days, received the same treatment, one dose of the drench for two days, and was also placed in a dark, quiet box stall. Both patients recovered. Shortly after the administration of the mixture both animals were taken with great excitement, followed by profuse perspiration and slight coma, to which succeeded an abundant diuresis, and complete liberty of the bowels. In both cases the convalescence lasted two months.—(*Arch. Vet.*)

REPORTS OF CASES.

FRACTURE OF THE SMALL EXTERNAL METATARSAL BONE—SYNOVITIS—DEATH.

By A. H. ROSE, D.V.S., HOUSE SURGEON TO AMERICAN VETERINARY COLLEGE HOSPITAL.

On May the 19th, a grey gelding ten years old, entered the hospital with the following history: A few days ago the animal received a kick on the outside of the leg, a little below the hock.

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From that day he had been very lame, and about forty-eight hours before its admission a flow of synovia had taken place through the wound some three inches below the hock. On admission, the animal is found lame on three legs, the off hind extremity, the seat of the injury, being much swollen from the foot above the middle of the hock. A wound is found below that joint with large granulations protruding and a flow of suppurating synovia flows freely from it. On account of the swelling and restiveness of the animal no crepitation could be detected, and a diagnosis of simple synovitis of the hock was made with a doubtful prognosis. For treatment the animal was placed in slings, and a constant cold irrigating apparatus applied to the part, but this was found so painful to the animal that it had to be stopped after three days. By this time a peculiar crepitation could be felt on the *inside* of the hock. Attempts to stop the flow of synovia were made with different agents, the repeated application of saturated solution of chloride of zinc proving most beneficial, but not sufficient, however, to stop it permanently. The appetite of the animal remained capricious, his pulse ranging from 75 to 50, and his temperature from $103\frac{1}{2}$ to 101. The treatment was thus kept up until the first of June, when a severe blister was applied over the hock. The symptoms remaining the same, the crepitation is felt better on the inside of the hock only, the leg is considerable atrophied, so is the dorso lumbar region of that side. The blister having fallen off by the 21st of June, and the general condition not having improved, the owner gave him up and he was destroyed.

On post mortem the hock joint was found, on the outer side, the seat of an abundant plastic infiltration, so thick that careful dissection of the ligaments could not be made. The whole joint being boiled and the bones scraped of the soft tissues, a fracture of the external small metatarsal was exposed, extending obliquely from the upper part of the bone about one inch below the hock, and running upwards into the center of the articular surface of the superior extremity of the bone, entering therefore into the joint. The articular cartilages of that bone, that of the lower surface of the cuboid, of the superior extremity of the

large metatarsal bone and of the cuneiform, were ulcerated and partly destroyed. The whole of the joint had been the seat of extensive periostitis, with bony deposits all over. The fragments of the small metatarsal were only partly united by an external callous.

This case presents points of interest. 1st. The fracture of a bone which is seldom the seat of such lesion alone, that is, without fracture of the principal metatarsal bone with it, a fact noticed in D'Arboval's Dictionary, by Zundel, where it is said that: *Seldom the peronei bones are fractured alone*, and record of which we failed to discover in any veterinary journal for a number of years back; and 2d. the peculiar feeling of the crepitation which, instead of assisting in the diagnosis, rather made it more obscure, and gave rise to the supposition of existing arthritis as a consequence of the existing synovitis.—Ed.

VETERINARY SOCIETIES.

OTTAWA CENTRAL VETERINARY MEDICAL ASSOCIATION.

The second meeting of the Association took place at the hall over Mr. Coleman's office yesterday, when subjects of interest to the profession were discussed. During the remarks of Dr. Coleman, the President, who read a short pithy paper on Diagnosis, he mentioned that the Vice-President, Mr. R. C. Hutchings, of Watertown, N. Y., had just sailed for England, and would, on his return, give the Association an account of foreign veterinary institutions, &c. Mr. Murcott gave an interesting description of a difficult case of parturition he had attended, which was well received by the meeting. Mr. C. Jalloway, V. S., Montreal, and Mr. George Falls, V.S., Perth, were unanimously elected members. The success of the Association is highly gratifying to the promoters. The next meeting, we understand, takes place at Brookville.—[*Daily Citizen, Ottawa, Canada.*]

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THE GERMS THEORY.

ITS APPLICATION TO MEDICINE AND SURGERY,

BY M. M. PASTEUR, CHAMBERLAND AND JOUBERT.

Translated by A. Liautard, M.D., V.S.

All sciences gain by assisting each other. When, after my first communication on fermentations, in 1857-'58, one could admit that ferments, properly so-called, were living beings, that germs of microscopic organisms exist in abundance on the surface of all objects, in the atmosphere, and in waters, that the hypothesis of a spontaneous generation is actually chimerical, that wines, beer, vinegar, blood, urine, and all the liquids of the organism undergo any of their common alterations to the contact of pure air, the medicine and surgery paid attention to these new lights. A French physician, Dr. Davaine, made the first happy application of these principles to medicine in 1863.

Our researches of last year have left the ætiology of the putrid disease or septicemia much less advanced than that of anthrax. We have rendered as most probable that septicemia results from the presence and multiplication of a microscopic organism, but the rigorous demonstration of this important conclusion remained undone. To affirm experimentally that a microscopic organism is really agent of disease and of contagion, I see no other way, in the actual state of science, than to submit the *microbe* (new and happy expression proposed by Mr. Sedillot) to the method of successive cultivations outside of the economy. Let us note that by twelve cultivations, each of a volume of ten cubic centimeters only, the original drop is diluted as much as if it had been in a liquid volume equal to the total volume of the earth. It is precisely the kind of experiments to which Mr. Joubert and I have submitted the carbuncular bacteridie. After cultivating it a great number of times in a liquid free from any virulent property, each cultivation having for seed a small drop

of the preceding one, we have seen that the product of the last cultivation was capable of multiplication and of action in the bodies of animals in giving them anthrax with all its symptoms.

Such is, for us, the undisputable proof that anthrax is the disease of the bacteridie.

Concerning the septic vibrio, our researches had not been so convincing, and it is to fill up this vacuum that we renewed at first our experiments. With this object in view, we attempted the cultivation of the septic vibrio, obtained on an animal which died with septicæmia. Remarkable fact, all our first experiments failed, notwithstanding the varieties of the means of cultivation that we used—urine, water of the swills of beer, bouillon of meat, &c.

Our liquids did not remain infertile, but we obtained generally a microscopic organism, having no connection with the septic vibrio, and having the form, very common, of chaplets, of spheroid small beads extremely fine and without any virulency. It is an impurity sowed unknowingly at the same time with the septic vibrio, and whose germ passed, no doubt, from the intestines, always inflamed and distended in septicemic animals, into the abdominal serosity where we first collected the seed of the septic vibrio. If that supposition, regarding the impurity of our cultivation, was correct, we ought, apparently, obtain the pure septic vibrio in taking it from the blood taken in the heart of an animal dead recently from septicæmia. That is what happened, but another difficulty appeared—all our cultivations remained unfertile. More than that, this sterility was accompanied with the sort of virulent power of the seed in the liquid of cultivation.

We then had the idea that the septic vibrio might be an exclusively anaerobic organism, and that the sterility of our sowed liquids was due to the fact that the vibrio was killed by the oxygen of the air in solution in those liquids. The Academy will remember that in other experiments I had noticed similar facts upon the vibrio of the butyric fermentation, vibrio which not only lives without air, but which is killed by it.*

* Is not this vibrio the same as the septic one, a new study that we have begun?

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These results had a necessary consequence. By exposing a liquid loaded with septic vibrio to the contact of pure air, all the vibrios ought to be killed and the virulency be removed. That is what takes place. Let us place some drops of septic serosity, spread on thin layer in a tube laying horizontally, and in less than half a day the liquid will become entirely inoffensive, even when, at first, it was so virulent that the inoculation of the smallest fraction of a drop of it was followed by death.

More than that, all the vibrios which fill up the liquid in profusion, under the form of moving threads, are destroyed and disappeared. After the action of the air, one finds only amorphous, fine granulations, unfit for cultivation or to the communication of any disease. It seems that the air burns the vibrios.

It is horrid to think that life may be at the mercy of the multiplication of these infinitely small ones. It is also consoling to hope that science will not always remain powerless before such enemies, when we see it, on scarcely beginning our studies, learning us for instance, that the simple contact of the air sometimes is sufficient to destroy them.

But if oxygen destroys the vibrios, how can they exist in septicæmia, where atmospheric air is everywhere present? * How make these facts agree with the theory of the germs? How can blood, exposed to the contact of air, become septic by the dusts that it contains?

All is concealed, obscure, and matter for discussion, when one ignores the cause of phenomena; all is light when one possesses it. What we have just said is true only for the septic liquid loaded with adult vibrios, in way of generation by scissiparity; things differ when the vibrios are transformed in germs, that is in shying corpuscles, described for the first time in my studies upon the diseases of the silk worms, precisely in the occasion of the vibrios of the worms which had died of the disease called *flacherie*. Adult vibrios alone disappear, are burned and lose their virulency to the contact of the air; the corpuscles-germs, in those conditions, remain always ready for new inoculations.

All this does not yet solve the difficulty of knowing how septic germs may exist on the surface of floating objects in the air

and waters. Where can these corpuscles take birth? Well, nothing more easy than the production of these germs, notwithstanding the presence of the air in contact with the septic liquids.

Let us take some abdominal serosity, with septic vibrios, all in the way of generation by scission, and let us expose it to the contact of the air as we did it, with only the precaution, however, of giving it a certain thickness, even of only one centimeter, and in a few hours we will see the following strange phenomena: In the superior layer of the liquid, the oxygen is absorbed, as it is manifested by the change of color of the liquid. There the vibrio dies and disappears. In the deep layers, on the contrary, at the bottom of this centimeter in thickness of the septic liquid upon which we are experimenting, the vibrios, protected against the action of the oxygen by those which die on the top, continue to multiply by scission. Thus, little by little, they pass to the state of germs-corpuscles with resorption of the remaining of the body of the filiform vibrio. Then, in the place of moving threads of linear dimensions of different sizes, whose length often surpasses that of the plate of the microscope, we only find a dust of shining points,* isolated or surrounded by an amorphous mass, scarcely visible. And thus is formed, living with the latent life of the germs, fearless of the destroying action of the oxygen, the septic dust. And thus we are prepared to understand what at first seemed to us all obscure. We can comprehend the sowing of putrescible liquids by the dusts of the atmosphere; we can comprehend the permanency of putrid diseases on the surface of the earth.

May the Academy allow me to abandon these curious facts without showing one of the most principal theoretical consequences. At the beginning of these researches—for they only begin—and though already a new world is discovered, what is to

* In our note of July 16th, 1877, we said that the septic vibrio is not killed by the oxygen of the air, nor by the oxygen at high pressure; that it is transformed in these conditions in germ-corpuscles. There is there an erroneous interpretation of the fact. The vibrio is killed by oxygen, and it is only when it is in thickness that it is transformed, by the absence of this gas, into germ-corpuscles, and that its virulency may be perpetuated.

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be looked for in most instances? It is the positive proof that there exists diseases transmissible, contagious, infectious, whose cause resides essentially and uniquely in the presence of microscopic organism. It is the proof that, for a certain number of diseases, we must forever drop all ideas of spontaneous virulency, the ideas of contagion and infection rising all at once in the bodies of men and animals to go and propagate themselves afterwards, under forms yet identical to themselves, all opinions fatal to medical progress and which rose from the gratuitous hypothesis of spontaneous generation, of ferments albuminoid matters, of hemi-organisms, of archebiosis and many other conceptions, without foundation in observation.

What must be looked for, in fact, is the proof that aside of our vibrio, there is no independent virulency proper to the liquid or solid matters, and that the vibrio is not only an epiphenomena of the disease of which it is the obliged companion. And what do we see in the results that I have made known? We see a septic liquid, taken at a certain time, when the vibrios are not yet transformed in germs, loose all virulency by the simple contact of the air, preserve, on the contrary, this virulency, though exposed to the contact of the air, with the only condition to have been in thickness during several hours. In the first case, after loss of virulency to the contact of the air, the liquid is unable to take that power again through cultivation; but in the second case, it conserves it and may propagate it even after having been exposed to the contact of the air. It is, then, impossible to sustain that aside of the adult vibrio or of its germ; there exists a virulent matter proper, liquid or solid. One cannot even suppose a virulent matter which would lose its virulency just at the same time that the adult vibrio dies, for this pretended matter would equally lose its virulency when the vibrios transformed into germs are exposed to the contact of the air. As in this case the virulency perishes, this can be but the fact of the exclusive presence of these germ-corpuscles. There remains but one hypothesis for the existence of a virulent matter in the soluble state; it is that such a matter, in sufficient quantity to destroy in our experiments of inoculation, would be constantly furnished by the vibrio itself

while in the way of propagation in the body of the living animal. But no matter, as this hypothesis supposes the existence, primordial and necessary of the vibrio

This supposition was made, and to confirm it numerous works were undertaken on the other side of the Rhine.

Doctor Panum, to-day Professor at Copenhagen, and after him several German physiologists, remained convinced of the idea that putrefaction develops in matters submitted to it, a soluble poison that neither coction nor a repeated distillation of several hours can alter in its properties, no more than chemical reactions of this order could prevent the effects of morphine or strychnine. This chemical poison is called by Dr. Bergmann and his followers by the name of *sepsine*. We have looked for it in the muscles and the liquids of the bodies of animals which had died with septicæmia; we have failed to find it yet, but we believe that we have the explanation of the facts observed by the German physiologists. The details which would be necessary to explain this, would carry me beyond the limits of this communication.

I have often said before this Academy, that there exists microscopic-ferments beings, with peculiar physiological properties, beginning at the *mycoderma aceti*, essentially ærobie, to the yeast of beer, which is at the same time ærobie and anærobie; and I have often insisted on this circumstance, that the life which manifests itself, even for a very short time, outside of all participation from free oxygen gas, carries at the same time phenomena of fermentation.

We have met in the vibrio of septicæmia, a microbe exclusively anærobie, as it develops itself only in a vacuum or in presence of inert gases. It must be a ferment. It is such. As long as the multiplication of the vibrio by scissiparity lasts, its life is accompanied with a giving-off of carbonic acid gas, of hydrogen gas, of a little of nitrogen, and of very small quantities of putrid gases. The production of these gases takes place only when the transformation of the vibrio into corpuscles-germs is about to take place.

This formation of gases during the life of the vibrio, explains

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the very rapid tympanitic swelling of animals dead with septicæmia and the emphysematous state of the cellular tissue, especially in some points of the body, the groins and axillas, where the inflammation is sometimes excessive.

I must add, without waiting any longer, that all of the vibrios are not anærobic; that one of the most common, for instance, which is frequently found at the surface of the infusions of the vegetable organic substances exposed to the contact of the air, vibrio very fluxuous and very quick in its motions, is exclusively ærobic. It absorbs oxygen and exhales carbonic acid nearly in equal quantity, thus reversing the physiology of the carbuncular bacteridie.

Short of time, I will only mention, in passing this vibrio—because it has been for us the source of very interesting observations—it is inoffensive. Introduced under the skin, it gives rise only to local troubles of little importance. Comparing its innocuity to the virulency of the septic vibrio, one might believe that the mode of life, so different for both, as one is ærobic and the other anærobic, would explain the opposition of the actions upon the economy. But the effects of the carbunculous bacteridie which, also, is essentially ærobic and nevertheless terrible, would not permit to accept this proposition. If this ærobic vibrio is harmless, it is because it cannot live in the temperature of the body of the animals. Towards 38° already, its motions and its multiplication are suspended, and once inoculated it disappeared under the skin—digested, we might say.

Scientific novelties often come against prejudices. Well, some will say, what of your bacteries and vibrios? What are those infinitely small to us? Are they not seen swarming everywhere? Are they not seen in abundance upon the linen of dressings, covering even the wounds granulating fast towards cicatrization? Is there any danger?

To these I would ask, of what infinitely small do you speak? We have seen that alongside the most dangerous vibrios, there exists very harmless ones, and certainly these last are far from being the only microbes free of all virulency.

Brought by the proof of the cause of the innocuity of the

aërobie vibrio, of which I have just spoke, to institute numerous experiments upon the limits of resistance of microscopic beings to various temperatures, and having found that the carbunculous bacteridie does not develop itself, or with much difficulty, at temperatures of 43-44 degrees in some liquids of cultivation, we thought that such was perhaps the explanations of a well-known fact, though quite mysterious, viz: that some animals remain refractory to anthrax disease. It had not been possible, in our experiments of last year, to give anthrax to our fowls. Might not the temperature of about 42° of these gallinaceous, combined to the vital power, be the cause of immunity in these animals? If this supposition was correct, we ought to develop anthrax easily in fowls in lowering the heat of their bodies. The success of this experiment was immediate. Inoculate a hen with the carbunculous bacteridie, and place it with its legs in a cold bath at 25°, which is sufficient to lower the heat of the whole body down to 37-38°—heat of animals susceptible to contract anthrax—and in 24 or 30 hours the hen will die, its whole body being filled with carbunculous bacteridies. Some opposite experiments have given us favorable results, that is to say that in raising the heat of animals which are liable to contract anthrax, we have protected them against this frightful disease to-day yet without remedy. Increase or limitate the power of these infinitely small, and disturb the mystery of their actions merely by a simple change of temperature, is one of the best facts to demonstrate what may be expected from the efforts of science, even in the study of the most obscure diseases.

Let us return again to our septic vibrio, and compare it, as far as the formation of its germs, to the carbunculous bacteridie, so as to impress our minds better with that conviction that microscopic organisms enjoy varied physiological properties, and that we may expect from them many various morbid manifestations.

Positive experiments have taught us that the septic vibrio can not only live and multiply in the most complete vacuum, or in the purest carbonic acid, but that it gives there its germs and that free oxygen gas is not necessary to interfere in their formation. On the contrary, the carbunculous bacteridie, in the pres-

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ence of a vacuum or of carbonic acid, is not only entirely unfit to live—that we know—but even to transform itself in corpuscles-germs. This last research is, however, one of the most delicate. So little of the air as may remain in the tubes where the vacuum is made, and where the cultivation of the carbunculous bacteridie is carried on, corpuscles-germs will appear to such an extent, that the most perfect *mercurial* pumps* are often useless to prevent the phenomena. We have been obliged to combine with the use of the vacuum of these pumps that of the liquids employed to absorb the most minute traces of oxygen, before we could convince ourselves that the carbuncular bacteridie is essentially ærobie at all periods of its life. What difference, then, between the septic vibrio and that of bacteridie, and how remarkable it is to see it multiply in the animal organism of beings so different by their mode of nutrition!

Another question, no less interesting, is that of knowing if the corpuscles-germs of the septic vibrio, though formed in the vacuum or in the pure carbonic gas, would not need, to return to life, some feeble quantities of oxygen. Physiology to-day knows of no possible germination out of the contact of the air. Well, nevertheless, the experiment proves that the germs of the septic vibrio are absolutely sterile in the contact of oxygen, whatever may be the proportion of this gas be; but it is on the condition, however, that there is no connection between the volume of the air and the number of the germs; as the first germinations, taking off the air in solution, may become a protection for the remaining germs; and it is so that, vigorously speaking, the septic vibrio may propagate itself, even in presence of small quantities of air, though this propagation is impossible if air is plenty.

A curious therapeutic observation presents itself. Let us suppose a wound exposed to the contact of the air, and in the conditions of putrid state likely to bring in the patient simple septicæmii accidents, I mean to say without other complication than those which would result from the development of the septic vibrio. Well, theoretically at least, the best means to prevent death would be to wash continually the wound with water *ærated*, or to

* *Pompes à mercure.*

push over the surface of the wound atmospheric air. The adult septic vibrios, in way of scissiparity, would perish to the contact of the air, and their germs remain all sterile. More than that, one might throw over the surface of a wound, air overloaded with germs of septic vibrios, wash the wound with water holding in suspension milliards of these germs, without giving rise for so much the slightest septicæmia in the operated. But that in such conditions, a single clot of blood, a small fragment of dead meat be lodged in a corner of the wound, protected from the oxygen of the air, that they remain surrounded with carbonic acid gas, even to a very small extent, and at once the septic germs will, in less than twenty-four hours, give birth to an infinity of vibrios, regenerating themselves by scission and likely to produce a septicæmia fatal in a short time.

(*To be continued.*)

CORRESPONDENCE.

A SKETCH OF THE DEVELOPMENT AND PRESENT STAND OF MICROSCOPIE IN GERMANY.

BY DR. EDWARD KAISER.

From the Zeitschrift für Mikroskopie, No 1, Oct. 1877.

BY A LADY FRIEND OF THE REVIEW.

The question as to when the microscope was first used in Germany as well as the time of its discovery is involved in impenetrable darkness.

The names of the first mikrologes are also entirely unknown. Philippus Bonannus is mentioned as the first who worked with the microscope and gave his discoveries to the world. George Hufnagel, of Frankfort, in the year 1592, published a work on insects, with fifty copperplates. Herr Harting, however, declares in his valuable researches this assertion to be very doubtful. According to his conclusions, the microscope was discovered several

years before the time of its discovery.

It is worthily reported in 1638, and its discovery.

Perhaps the microscope.

The fact of the labors of H. and Grew and the microscopical field by the definition gave no account.

As the *sine qua non* of the microscopical field, was the improvement of the use of the scientific research.

Although to Holland, matism, 1807-1811. facture of a of microscopical—describe 1811, that introduction of acromatic lens present day. allied to the steps in necessary to microscope.

years before the year 1610, but certainly not before 1584. From the time of its discovery until about 1600 it remained comparatively unknown.

It is worth mentioning, however, that the first microscope, as is reported by Leibnitz, was brought from England to Cologne, in 1638, and not directly from Holland, the real cradle of microscopy.

Perhaps, however, there may have been isolated cases where microscopical work was carried on in Germany.

The fact is that the microscope first came into use, after the labors of Hooke, Malphigi, Leeuwenhoek, Schwammerdan, Ruysch and Grew were given to the world. The endeavors in the microscopical field remained very few, a circumstance which was caused by the defective construction of the microscope of that day, which gave no accurate results.

As the discovery of the microscope was the absolute *conditio sine qua non* for the origin of microscopy, even so, the perfection of the microscope, through the manufacture of acromatic objectives, was the indispensable condition by which microscopy could be improved and perfected to an exact scientific discipline, so that the use of the microscope could be extended and applied to scientific research.

Although the honor of the discovery of the microscope belongs to Holland, Germany and Holland shared the discovery of acromatism, through the labors of Van Deyl and Frawenhofer from 1807-1811. The first era of microscopy begins with the manufacture of acromatic lenses. We must, therefore—for the history of microscopy in general, as well as its development in Germany—describe two periods, the first, from about the year 1600 until 1811, that is from the discovery of the microscope, and the introduction of the microscope into Germany, to the first use of the acromatic lens. The second period extends from 1811 to the present day. In both periods, the progress of microscopy is closely allied to the perfection of the microscope. In the examination of the steps in the development of microscopy, it is absolutely necessary to search for the first line in the development of the microscope.

In the second period an event presents itself, which induces us to divide this period into two subdivisions. In the year 1839, Schwamm published his work on the foundation of all organic bodies—the cell. This was succeeded by a much needed, very valuable work, for instruction in the use of the microscope. The great and progressive improvement in the microscope, had made possible the works of Schwamm and Vogel.

The basis for this progress in the formation in the compound microscope was laid in France in 1824, through the discovery of the possibility of uniting several acromatic lenses to make an objective system. Selligie and Chevalier were the first who worked with them. Amici obtained such favorable results that the work of perfecting went on, which led to the first histological work of value.

We separate the second period of the German microscopy into two parts: The first extending from 1811 to 1839, and the second extending 1839 to the present day.

As we do not intend to examine more fully the development of the German microscope, we shall not sketch its history further, but confine ourselves to mentioning the most important historical details, in order to understand rightly the position of microscopy in Germany.

If we consider the progress of microscopy in Germany we shall see that it is identical with the development of the microscope itself. We shall examine first the simple and then the combined dioptric microscope.

The oldest, simple, dioptric microscope known under the name *Vitrum publicarum*, was very little qualified for microscopical observation, as the medium failed to regulate the distance between lens and object. It consisted of a short tube, with a lens which magnified about nine times, and on the other end, a flat glass plate upon which the object was glued—a flea or something of the kind. Other simple microscopes were constructed of lenses enclosed in a ring or cylinder, which rested upon an upright, the object being placed upon a second, which was arranged so that the correct focus was obtainable. Still, more perfect instruments were made in 1673, by Leeuwenhoek, many of which were brought

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to Germany. These instruments magnified, on an average, from 70-130 times, and in their entire constructions were more useful for scientific observations.

The first and oldest German microscope maker was Cosmus Conrad Cuno, of Augsburg. His microscopes were of a different construction, but were the equal of those of Leeuwenhoek, in mechanical work. His lenses, however, were far inferior.

As the work of cutting lenses was very tedious, small melted glass balls were used. These were first made in Germany by Frederick Schrader, and were really more advantageous than the first cut lenses.

At the commencement of the eighteenth century, the simple microscope called the Wilson microscope, was brought in large numbers from England to Germany. In 1740, the maker added a glass for reflecting lights. At the same time, Johann Nathaniel Lieberkuhn of Berlin, made himself famous, through his excellent, powerful lenses, and in constructing an anatomical microscope, very similar to a microscope made by Lentmann, but which, in practical value, did not compare with it.

A century after the discovery of the single microscope progress had been made, through many contrivances, so that the distance between object and lens could be regulated. The arrangements were primitive indeed if we judge them by our present mechanism. Very small biconvex glasses were used as lenses, with a magnifying power of 2-300 times. Oftener small glass balls were used with a still greater magnifying power. By this manner of magnifying the light was not sufficient, so a lens was placed behind the object in order to concentrate the light upon it. Others proposed regulating the light by the use of diaphragms, to be arranged according to the objects under observation.

Lieberkuhn, improved illumination from above by the introduction of concave metallic mirrors.

One obstacle still remained to the simple German microscope, the fact that the operator held his hand against the light, thereby hindering essentially many researches. This inconvenience was, overcome by Joblot, through the introduction of a lens holder, with a jointed foot; and later, as already mentioned by Wilson

by means of reflecting mirrors. It had now become apparent that an object table was necessary to complete the microscope, which likewise demands an increase in the solidity of the stative. In this manner, as well as through the improved lenses the magnifying power had been increased nearly 700 times, so that better and more perfect focusing arrangements became absolutely necessary. The first simple microscope with an object table was made by Cuff, in 1755. This microscope had better arrangements for more accurate focusing. In the last half of the last century, as well as in the first half of this century, microscopes were made more or less similar to those of Cuff. Joblot, in France, in 1718, improved the optical apparatus by uniting two biconvex lenses into a double, which Euler first made practical and brought into a condition suitable for general use.

This was the point of development to which the simple microscope had arrived at the end of the first period in the history of microscopy. It deserved unreservedly the preference over the compound microscope. For this reason all the most important micrographic researches were carried on by the aid of the simple microscope. Many doubted the possibility of perfecting the compound microscope so that it could replace the simple one.

Let us examine the development of the compound dioptric microscope.

In what form, the compound dioptric microscope came from the hands of the discoverer, it is impossible to declare with certainty, yet, we can safely affirm, that it consisted of two convex glasses. This arrangement was used until the middle of sixteenth century, then a third lens—convex, was added, or two plain convex lenses. Its power was very small and as a maximum about 80 lines. One hundred and forty diameters could be attained by lengthening the tube in an extraordinary manner.

Among the oldest and most famous compound microscopes were those made by Robert Hooke, the Roman Eustachio Divini. On the principle of Divini, Johann Franz Grindel of Ach, made, in 1685, a microscope which had six plain convex lenses arranged in pairs, with the convex surface turned toward each other. Over the ocular was a perfectly plain glass. The compound microscope

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was essentially improved thereby. It obtained but little favor, although a century later his compound microscope, in practical construction, was better than the microscopes manufactured at that day. This surprising condition of affairs had its origin in the difficulty of uniting the lenses in such a manner that their poles lay in a parallel line. Grindl recognized this difficulty and overcame it.

At the same period the compound microscope was still further perfected by Carl Anton Tortona, by means of a perforated object table, rendering the use of reflected light much more practicable. Smaller lenses, with a narrow opening, could be used, so that greater magnifying power could be produced without using a stronger ocular or lengthening the tube of the microscope. With the power of 80 diameters of the past it was impossible to obtain pictures that were recognizable, which can accomplish at the present time with a power of magnifying 20 times so that it was now possible to obtain good results with powers of 2-200 diameter. This was achieved by Philippus Bonannus, who applied a mechanical apparatus for changing the distance between the objective and the object.

Up to this time greater magnifying power by this microscope was produced by lengthening the tube, and thereby the distance between the objective and the ocular. Bonannus employed the use of three different tubes, each of which contained three bi-convex lenses. Bonannus used artificial light to illuminate by his instruments, although daylight was perfectly practicable. The artificial light was conveyed by means of a lamp through two bi-convex lenses.

(To be continued.)

SUNDRIES.

HOGS IN THE UNITED STATES.

The Commissioner of Agriculture furnishes the following statistics of the number of swine in the United States, from which it appears that Iowa has stood foremost among the pork-pro-

ducing States, for three years past, with Illinois a good second. Indiana held third place two years ago, but for two years past Missouri has taken that position. Ohio comes next on the list; and these five great States, it will be seen, furnish about forty per cent. of the entire number in the United States. The interest appears to be rapidly assuming large proportions in Kentucky, Tennessee, North Carolina, Georgia, Mississippi, and Texas; while the general aggregate is not now quite up to the figures reached in 1873, the intervening years showing considerable falling off. The Commissioner's figures are as follows :

	1878.	1877.	1876.
Iowa.....	2,950,000	3,263,200	3,296,200
Illinois.....	2,900,000	2,750,000	2,640,100
Missouri.....	2,585,600	2,560,000	1,874,300
Indiana.....	2,422,500	2,375,000*	2,136,000
Ohio.....	2,250,000	1,755,700	1,596,100
Kentucky.....	1,950,000	1,588,200	1,604,300
Tennessee.....	1,900,000	1,087,900	1,026,400
Texas.....	1,716,700	1,144,500	1,090,000
Georgia.....	1,586,900	1,483,100	1,360,700
Mississippi.....	1,284,400	1,189,300	792,900
North Carolina.....	1,180,000	735,500	758,300
Arkansas.....	1,040,300	1,000,300	901,200
New York.....	975,000	580,000	568,700
Alabama.....	952,300	793,600	755,900
Pennsylvania.....	937,200	901,200	875,000
Virginia.....	759,200	607,400	589,800
Wisconsin.....	635,300	562,300	540,700
Michigan.....	556,100	505,600	459,700
South Carolina.....	450,000	284,100	275,900
California.....	438,500	417,700	363,300
Kansas.....	431,700	359,800	246,500
Louisiana.....	350,000	242,600	222,600
West Virginia.....	281,500	270,700	248,400
Maryland.....	259,600	252,100	233,500
Nebraska.....	255,700	170,500	80,900
Oregon.....	198,100	188,700	181,500
Florida.....	190,000	166,600	175,400
Minnesota.....	180,000	215,500	213,400
New Jersey.....	154,400	151,400	153,000
Massachusetts.....	78,600	78,600	75,600
Maine.....	62,200	59,900	58,800
Connecticut.....	59,500	58,400	57,900
Vermont.....	54,300	53,300	51,800
Delaware.....	47,600	46,700	46,700

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Fluids

	1878.	1877.	1876.
New Hampshire	42,900	38,700	37,300
Rhode Island.....	18,100	17,100	16,300
Colorado.....	12,500
Nevada.....	10,800	5,400	5,200
The Territories.....	105,000	116,500	116,500
Total.....	32,242,500	28,077,100	25,726,800

Number reported in the United States in previous years:

1875.....	28,062,200	1872.....	31,796,300
1874.....	30,860,900	1871.....	29,457,500
1873.....	32,632,050	1870.....	26,751,600

—*National Live Stock Journal.*

CURE FOR SPRING HALT.

In order to cure the spring halt, split the skin on the inner side of the affected leg, four inches above the hoof, over the main middle vein of the leg, and underneath the vein you will find a small cord about the size of a rye straw. This must be taken up with an awl and cut in two, which will certainly cure. Let the operator be careful not to cut the vein, or any of the sinews of the leg. Wash the wound with soapsuds, twice every day till it is well.

METRIC SYSTEM.

FORMULÆ FOR CONVERTING TROY INTO METRIC WEIGHT.

EXACT EQUIVALENTS.			CONVENIENT APPROXIMATIONS.	
		GRAMMES.		GRAMMES.
gr. i	=	0.064	gr. j	0.06
gr. 15. ⁴³⁷ / ₁₀₀₀	=	1.00	gr. xv.	1.00
ʒi.	=	3.88	ʒi.	4.00
ʒi.	=	31.10	ʒi.	30.00

Fluids as well as solids are prescribed by weight.

SPECIMENS

SENT TO THE MUSEUM OF AMERICAN VETERINARY COLLEGE.

105.	Jaws, 32 years old.....	C. H. PEABODY, D.V.S.
106.	Os Pedis, showing absorption.....	" "
107.	Fracture of Tibia at Tibio Tarsal Joint.....	" "
108.	Osteo-sarcoma, Lower Maxillary. Cow.....	A. LIAUTARD, M.D., V.S.
109.	Patent Shoes.....	C. H. PEABODY, D.V.S.
110.	Parrot Mouth.....	L. T. BELL, D.V.S.
111.	Monkey's Skull.....	A. LIAUTARD, M.D., V.S.
112.	Shoe for Navicularthrititis.....	L. MCLEAN, V.S.E.
113.	Fracture Metatarsal Bones.....	W. ROSE, V.S.
114.	Strongylus Paradoxus.....	J. B. COSGROVE, D.V.S.
115.	Hair Ball from Stomach of Calf.....	W. ROSE, V.S.
116.	Atlas with Ulceration, Osteitis and Exostosis.....	"
117.	Skull of Monkey.....	A. LIAUTARD, M.D., V.S.
118.	" Mastiff Dog.....	" " "
119.	" Greyhound.....	" " "
120.	Star Fish.....	S. S. FIELD, D.V.S.
121.	Navicular Bone, showing arthritis.....	A. A. HOLCOMBE, D.V.S.
122.	Orchitis.....	W. B. MILLER.
123.	Larynx.....	C. H. PEABODY, D.V.S.
124.	Lumbar Vertebrae of a Whale.....	G. BAILEY, Esq.

A NEW TREATMENT FOR LAMINITIS.

Copious bleeding is indispensable, say six or eight quarts taken from the neck-vein and two or three from the plate-veins of the legs. Turn up his feet, fill the feet with spirits of turpentine, set it on fire and let it burn until the foot is well warmed; make a rope of hay or straw and wrap his legs from the hoof to the body. Steam well with warm water, give one ounce of aloes, dissolved in one pint of linseed oil, give green feed or bran mashes, compel him to take a little slow exercise; after he has somewhat recovered, stand in a vat or mud-hole five inches deep, so as to soften his feet. If he is barefooted, put on a thick, heavy pair of shoes—iron is a good conductor of heat, and thereby keeps the foot cool.

—*Loc. Cit.*

VET

A. LARGE,

VETER

HOLT